Claims

Claims 1-14 inclusive: *Canceled*

15. *(Currently amended)* A magnetic recording disk comprising:

a substrate; and

an antiferromagnetically-coupled structure on the substrate and having two remanent magnetic states in the absence of an applied magnetic field, the structure comprising

(a) a first lower ferromagnetic layer having a remanent magnetization Mr, a thickness t and a remanent-magnetization-thickness product Mrt; (b) a ferromagnetically-coupling layer on the first lower ferromagnetic layer; (c) a second lower ferromagnetic layer on the ferromagnetically-coupling layer and having an Mrt; (d) an antiferromagnetically-coupling layer on the second lower ferromagnetic layer; and (e) an upper ferromagnetic layer on the antiferromagnetically-coupling layer, wherein the upper ferromagnetic layer has ~~and having~~ an Mrt greater than the sum of the Mrt values of the first and second lower ferromagnetic layers and an intrinsic coercivity substantially greater than the intrinsic coercivity of each of the first and second lower ferromagnetic layers;

and wherein, in each remanent state, the magnetization directions of the first and second lower ferromagnetic layers are substantially parallel to one another and antiparallel to the magnetization direction of the upper ferromagnetic layer, and the magnetization direction of the upper ferromagnetic layer in one remanent state is substantially antiparallel to its magnetization direction in the other remanent state.

16. *(Canceled)*

17. *(Original)* The disk of claim 15 wherein the lower ferromagnetic layers have substantially the same Mrt.

18. *(Original)* The disk of claim 15 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Ru, wherein Ru is present in the alloy in an amount greater than approximately 40 atomic percent and less than approximately 70 atomic percent.

19. *(Original)* The disk of claim 15 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Cr, wherein Cr is present in the alloy in an amount greater than approximately 27 atomic percent and less than approximately 45 atomic percent.

20. *(Original)* The disk of claim 15 wherein the ferromagnetically-coupling layer consists essentially of Pt or Pd.

21. *(Original)* The disk of claim 15 wherein the ferromagnetically-coupling layer has a thickness between approximately 0.5 and 5 nm.

22. *(Original)* The disk of claim 15 wherein the ferromagnetically-coupling layer consists essentially of Ru or Cr having an exchange constant greater than approximately 0.02 ergs/cm^2.

23. *(Currently amended)* The disk of claim 15 wherein the upper ferromagnetic layer is an alloy comprising Co, Pt, Cr and B, and wherein each of the lower ferromagnetic layers is an alloy comprising Co and Cr <u>with no Pt</u>.

24. *(Original)* The disk of claim 23 wherein each of the lower ferromagnetic layers is an alloy further comprising Ta.

25. *(Original)* The disk of claim 15 wherein the antiferromagnetically-coupling layer is a material selected from the group consisting of ruthenium (Ru), chromium (Cr), rhodium (Rh), iridium (Ir), copper (Cu), and their alloys.

26. *(Original)* The disk of claim 15 further comprising an underlayer located on the substrate between the substrate and the first lower ferromagnetic layer.

27. *(Original)* The disk of claim 15 further comprising a protective overcoat formed over the upper ferromagnetic layer.

28. *(New)* A magnetic recording disk comprising:

a substrate; and

an antiferromagnetically-coupled (AFC) magnetic recording layer on the substrate and capable of having two remanent magnetic states in the absence of an applied magnetic field, the AFC magnetic recording layer having a composite remanent-magnetization-thickness product Mrt(COMPOSITE) less than the Mrt(COMPOSITE) of an AFC reference structure, wherein the AFC reference structure has a upper ferromagnetic layer with an Mrt value of Mrt(UL) and an antiferromagnetically-coupled single lower ferromagnetic layer with an Mrt value of Mrt(SLL-Max), wherein Mrt(SLL-Max) corresponds to the Mrt of a single lower ferromagnetic layer that results in the maximum achievable signal-to-noise ratio (SNR) for the AFC reference structure, the AFC magnetic recording layer comprising:

(a) a first lower ferromagnetic layer having an Mrt value of Mrt(LL1); (b) a ferromagnetically-coupling layer on the first lower ferromagnetic layer; (c) a second lower ferromagnetic layer on the ferromagnetically-coupling layer wherein the second lower ferromagnetic layer has an Mrt value of Mrt(LL2); (d) an antiferromagnetically-coupling layer on the second lower ferromagnetic layer; and (e) an upper ferromagnetic layer on the antiferromagnetically-coupling layer wherein the upper ferromagnetic layer has an Mrt value of Mrt(UL) substantially equal to Mrt(UL) of said AFC reference recording layer and greater than the sum of Mrt(LL1) and Mrt(LL2), and an intrinsic coercivity substantially greater than the intrinsic coercivity of each of the first and second lower ferromagnetic layers;

wherein the sum of Mrt(LL1) and Mrt(LL2) is greater than Mrt(SLL-Max); and

wherein, in each remanent state, the magnetization directions of the first and second lower ferromagnetic layers are substantially parallel to one another and antiparallel to the magnetization direction of the upper ferromagnetic layer, and the magnetization direction of the upper ferromagnetic layer in one remanent state is substantially antiparallel to its magnetization direction in the other remanent state.

29. *(New)* The disk of claim 28 wherein the upper ferromagnetic layer is an alloy comprising Co, Pt, Cr and B, and wherein each of the lower ferromagnetic layers is an alloy comprising Co and Cr with no Pt.